R E P O R T R E S U M E S

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A STUDY OF THE NEED FOR TECHNICIAN TRAINING IN AGRICULTURE AND WELDING AT YUBA COLLEGE.

BY- ORUM, EARL
YUBA COLL., MARYSVILLE, CALIF.

PUB DATE 31 AUG 65

EDRS PRICE MF-$0.50 HC-$2.68 65P.

DESCRIPTORS- *JUNIOR COLLEGES, *AGRICULTURE, *CURRICULUM DEVELOPMENT, VOCATIONAL EDUCATION, *FEASIBILITY STUDIES, *TECHNICAL EDUCATION, WELDING, EDUCATIONAL NEEDS, MARYSVILLE

OBJECTIVES OF THE STUDY INCLUDED INVESTIGATION OF THE INTEREST OF LOCAL HIGH SCHOOL STUDENTS IN THESE OCCUPATIONS, ESTABLISHING THE NEEDS FOR PERSONS SO TRAINED, DETERMINING THE TYPE OF TRAINING NECESSARY, DEVELOPING THE CURRICULA, AND OBTAINING INFORMATION USEFUL FOR PLANNING FACILITIES AND NECESSARY EQUIPMENT. THE FOUR AREAS SPECIFICALLY CHOSEN FOR STUDY WERE AGRICULTURAL ENGINEERING TECHNOLOGY, AGRICULTURAL SCIENCE TECHNOLOGY, NURSERY AND LANDSCAPING TECHNOLOGY, AND WELDING TECHNOLOGY. JOB TITLES UNDER EACH OF THESE CATEGORIES ARE LISTED AND THE PROCEDURES USED (APPOINTING THE ADVISORY COMMITTEE, DEVELOPING SURVEY FORMS, ETC.) ARE DESCRIBED. THE STUDY LED TO THE RECOMMENDATIONS THAT PROGRAMS OF (1) NURSERY AND LANDSCAPING, (2) AGRICULTURAL ENGINEERING AND WELDING, AND (3) AGRICULTURAL SCIENCE BE DEVELOPED TO TRAIN STUDENTS AS TECHNICIANS AND THAT THEY BE DEVELOPED IN THAT ORDER WITH APPROPRIATE GUIDANCE AND COUNSELING AND FOLLOWUP PROGRAMS. SURVEY FORMS, COMMENTS, AND DESCRIPTIONS OF PROPOSED CURRICULA ARE INCLUDED. (JP)

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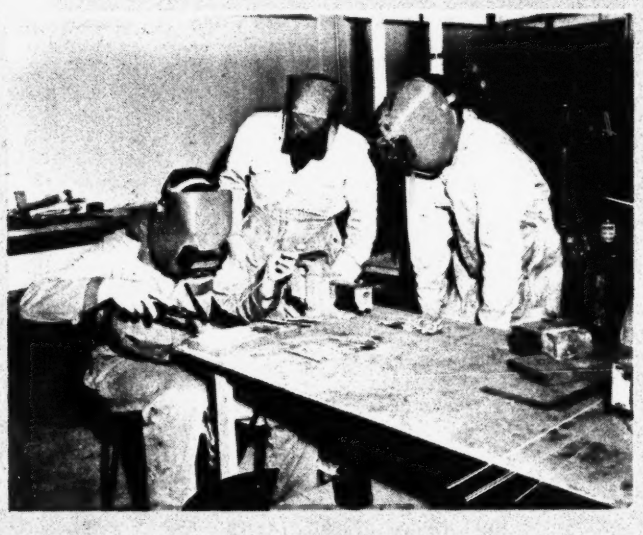
ODAY'S RAINING



TOMORROW'S TECHNICIAN

A STUDY OF THE NEED FOR

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UNIVERSITY OF CALIF.
LOS ANGELES

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By
EARL ORUM
Study Supervisor
Agriculture Department

YUBA COLLEGE
Marysville, California

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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This study was cooperatively sponsored by Yuba College and the Vocational Education Act of 1963

August 31, 1965

PREFACE

The importance of agriculture and the related agricultural industry to California, and specifically to Northern California, is a well accepted fact. The advancement in agriculture technology in the past decade has been made evident by the increase of agricultural products at the same time that there has been a decrease in both the land and the labor supply. These advances have prompted those in agriculture education to re-evaluate their programs and to provide training for those technician programs in agriculture as well as those in production agriculture. As advancement is made in agriculture technology, there is an ever increasing need for a better trained work force with more skills and technical knowledge than was previously required. The job opportunities and job requirements in the agriculture and welding technology fields in California - specifically in Northern California - prompted this study.

Appreciation is extended to the many businesses, farmers, and other individuals who cooperated in carrying out this study.

The Yuba College Agriculture Advisory Committee furnished valuable assistance in the preparation, interpretation, analysis, and recommendations of the study. For this assistance, appreciation is extended to these persons:

Louis Kurtz, Chairman	Roy Landerman
Sandy Beck	Abel Leal
Buck Beeler	Carroll Moore
Lewis Clift	William Pattison
Russell Freemyers	Leland Ruth

Appreciation is also extended to the following: Earl Orum, Study Supervisor, Yuba College Agriculture Department; Dr. Orville E. Thompson, Study Consultant, University of California, Davis; and to Jerry Shinkle, who conducted the personal interviews.

Appreciation is further expressed to the Board of Trustees and to the Yuba College Administration for the leadership and interest in developing and conducting this study.

George W. Vaught, Chairman
Applied Arts and Science Division
Yuba College

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CHAPTER I

INTRODUCTION

PURPOSE OF THE STUDY

To determine the need for technician training in agriculture and welding at Yuba College.

OBJECTIVES

1. To investigate the interest of local high school students in occupations in agriculture and welding.
2. To establish the need for persons trained in these occupations.
3. To determine the type of training necessary to prepare persons for careers as technicians in agriculture and welding.
4. To develop curriculums to perform the training.
5. To obtain information useful in planning facilities and equipment necessary for implementation of training.

JUSTIFICATION FOR STUDY

Many factors must be considered by the junicr college administrator who contemplates the establishment of a technical education program in his school. He must have extensive and dependable information upon which to base his decisions.

In 1963 concern for technical education was expressed by the Yuba College Accreditation Team. In its report the following statements appeared:

> The vocational-occupational function of the junior college appears to be the function most neglected at Yuba College. Little or no use is made of special advisory committees and it appears that the only true occupational programs offered are the business programs and vocational nursing. The previous committee suggested that occupational data via surveys or other suitable means be acquired and that an appropriate plan to coordinate all phases of vocational education be developed. The status of occupaticnal education or training appears to be at the same point as the previcus visit.

On October 22, 1964, an ad hoc "Subcommittee on Technology Curriculum" was appointed by the ad hoc Joint Committee to study the feasibility of initiating the following technology programs:

Agricultural Technology

Automotive Technology (probably including diesel)

Data Processing (probably programming phase)

Drafting Technology

Electronics Technology (general)

Engineering Aide

Machine Shop and Metals Technology

Real Estate and Certificate Program

Vocational Nursing

Welding Technology

The specific charge to the subcommittee included reporting to the Joint Committee the following information on each technology:

What is encompassed within this technology?

What are the present needs of society, especially that of California, for individuals trained in this technology?

Is this technology really appropriate for development at this college? Why or why not?

Which courses do we now have in the curriculum which lend themselves either as direct or service courses in this curriculum?

Which courses would need to be initiated to bring the program to **minimum** requirements for training students in each technology?

Which facilities does the college now have which lend themselves to use in these technologies?

Which additional facilities would have to be provided to bring the program to **minimum** requirements for training students in each technology?

What are the estimated costs in each case?

What order of PRIORITY does the Subcommittee recommend that the Joint Committee establish for development of the various technologies?

Subsequently the Administration approved the plan for the Agriculture Department to undertake this study. Matching funds from the Vocational Education Act of 1963 made this study possible.

The general need for occupational education today is illustrated by Norman C. Harris in the following statement:

> The national need for semi-professional and technician manpower is critical. The National Science Foundation in a 1961 study concluded that by 1970 the national need for technicians in industry alone would exceed 1,262,000. This figure, contrasted with the 630,000 employed in 1960, indicates that the supply must be doubled in the decade. Allowing for deaths and retirements, as well as for new demands, almost 68,000 new technicians would have to be educated and trained each year to meet the 1970 estimated demand. It is doubtful that the current annual rate of production of technicians from all sources (junior colleges, technical institutes, industry training programs, and armed services schools) exceeds 35,000. Further, other sectors of the economy, such as government, education, health fields, employed another 240,000 technicians in 1960, and this figure will probably be doubled in 1970 also. Most certainly there is a challenge here for the junior colleges.[1]

SCOPE OF THE STUDY

Since the field of agriculture is so broad and inclusive, it was decided that it would not be feasible to study all of the technical job opportunities in agriculture. Instead, it was concluded that the study be confined to three areas which show definite need in the community, are adaptable to present facilities and equipment, and are related to the curriculum presently being offered by the department.

The present welding courses are occupational in intent and are taught by the staff of the Agriculture Department. Hence, it was decided to include welding technicians in the study.

The four areas specifically chosen for this study then were these:

Agricultural Engineering Technician

Agricultural Science Technician

Nursery and Landscaping Technician

Welding Technician

1. Norman C. Harris, "Technical Education in the Junior College/New Programs for New Jobs", Washington, D. C.: American Association of Junior Colleges. 1964. p. 28.

LIMITATIONS OF THE STUDY

The primary service area of Yuba College which was surveyed included the counties of Butte, Colusa, Glenn, Sutter, and Yuba.

A secondary area included the metropolitan districts surrounding Sacramento, San Francisco Bay area, and the San Joaquin Valley. Firms from the following counties were included in the survey: Alameda, Contra Costa, Napa, Placer, Sacramento, San Francisco, San Joaquin, Santa Clara, Solano, and Yolo.

These areas were studied because of:

1. the mobility of today's population.
2. the centralization of managerial offices of many cooperatives and corporations in or near large metropolitan areas. (Many of these have branch offices for either purchasing or selling in the primary areas.)
3. the employment opportunities in the metropolitan areas for persons interested in sales of goods and services, and for ultimate placement of technicians. (See Figure 1.)

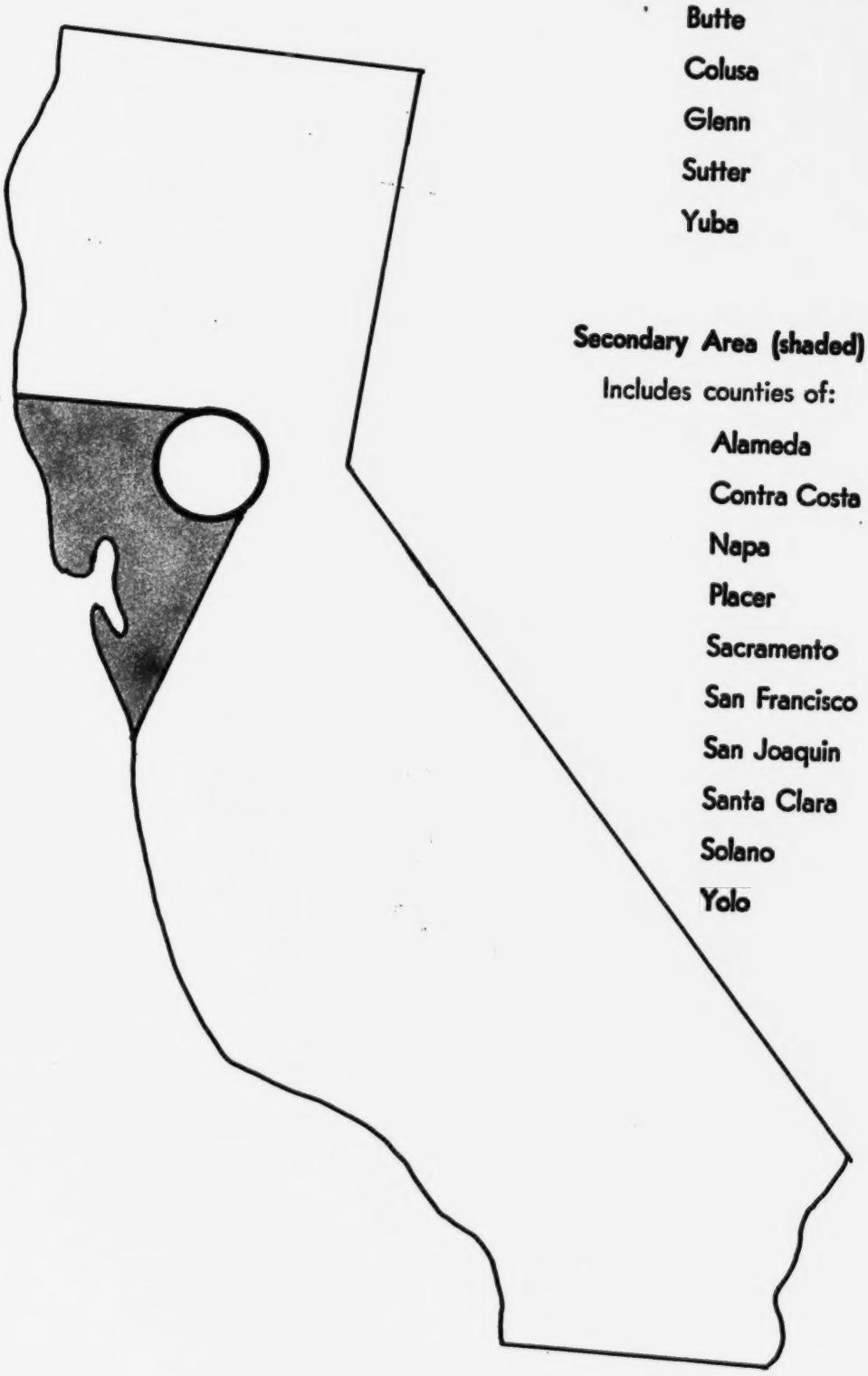
WHAT IS A TECHNICIAN?

There is a wide range of technical occupations. Many technicians work at highly sophisticated levels in research, design, and prototype production. Theoretical knowledge approaching that of the professions, combined with some practical "know-how" about instruments, tools, and laboratory equipment is required for such work. Men and women in these jobs are coming to be called "semi-professional technicians", and college level educational programs are required for their education. At the other end of the technical job spectrum are those occupations which demand a high degree of manual skill and ingenuity but require only a modest background in science, mathematics, and technical theory. Persons who hold these jobs are commonly called "highly skilled technicians". Many persons reach this level through on-the-job or armed services training programs, and a few via technical high schools and vocational schools, but the main avenue of the future will probably be through junior colleges and technical institutes since college study will be increasingly required in the future.

It is important to remember that there are many degrees and kinds of technicians between these two extremes. The gap between the professions and the skilled worker cannot be filled by one kind or level of technician - a great variety of talents and specialized abilities is needed.[2] (See Figure 2.)

2. Harris, p. 35.

MAP OF THE AREA SURVEYED



Primary Area Counties

- Butte
- Colusa
- Glenn
- Sutter
- Yuba

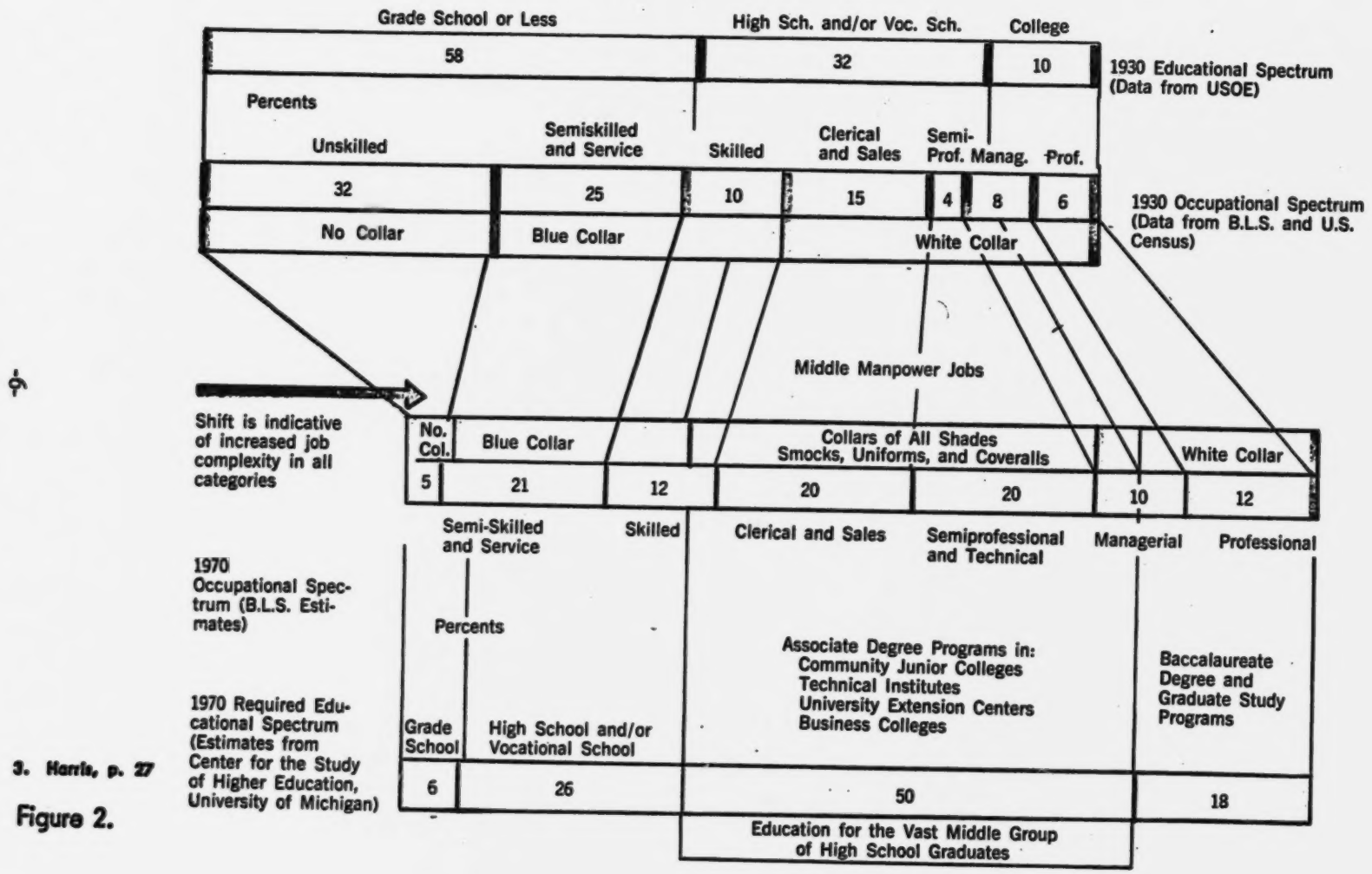
Secondary Area (shaded)

Includes counties of:

- Alameda
- Contra Costa
- Napa
- Placer
- Sacramento
- San Francisco
- San Joaquin
- Santa Clara
- Solano
- Yolo

Figure 1.

OCCUPATIONAL TRENDS AND EDUCATIONAL REQUIREMENTS
(U.S. Labor Force—1930 and 1970)



3. Harris, p. 27

Figure 2.

REVIEW OF LITERATURE AND RESEARCH

Agricultural Engineering Technician

Job titles and positions typical of this group include the following:

Draftsman

Conservation Technician

Engineering Technician

Equipment Specialist

Construction Superintendent

This group includes those workers trained and qualified for work requiring the understanding and use of mechanical, chemical, physical, and engineering concepts in agricultural applications.[4]

Knowledge and skill in the mechanical field is the primary requirement for agricultural engineering technicians. This includes a knowledge of basic shop techniques, farm power, machinery, irrigation equipment, and electricity. Of special interest in this employment area is the need for a sound foundation in mathematics - an important skill bearing on the proficiency of the engineering technician. Because much of the agricultural equipment is directly involved in farm operations, adequate knowledge of crops, soils, and irrigation is an essential recommendation.[5]

Agricultural Science Technician

Job titles and positions typical of this group include the following:

Fieldman

Farm Supervisor

Ranch Foreman

Field Representative

Herdsman

Range Conservationist

4. Jerry J. Halterman, *Technicians in Agriculture*, Sacramento: California State Department of Education and Modesto Junior College, 1962. p. 36.

5. Luverne Donker, *Agricultural Technicians*: Sacramento: California State Department of Education and Modesto Junior College, 1964. p 25.

Workers in this group should possess technical competence in and be involved primarily with the actual production of agricultural commodities at the farm and ranch level.[6]

These technicians must be versatile. Farm experience is of extreme importance. Nearly all need training in agricultural engineering to some extent. In addition to an understanding of production agriculture, these people need training in agricultural business management and economics. Anyone intending to be a fieldman needs also to understand the fundamentals of disease and pest control and soil management. For ranch foreman or supervisors, skill in handling labor is a job requirement. Certain forestry technicians are included in this group.[7]

Nursery and Landscaping Technician

Job titles and positions typical of this group include the following:

Landscape Design Technician

Park Leadman

Landscape Foreman

Nurseryman

Plant Specialist

Included in this group are those trained and qualified in the technical aspects of producing nursery and landscaping materials, of using plants and other landscaping material in designing, and of planting and supervising the construction activities associated with landscaping.[8]

Individuals qualifying for this occupation need, first of all, an understanding of plant materials and adaptation characteristics for the area in which these plants are grown. Secondly, they require a sound understanding of moisture and fertility requirements as well as of disease and pest control problems associated with these plant materials. Finally, they need some training in the field of landscape arts. All of this is required because the ability to give frequent, sound advice is quite evident as one of the prime requisites for success in the field. Further recommendations include basic sales and business training. Some shop skills can be added as being very desirable.[9]

6. Halterman, p. 25.
7. Donker, p. 24.
8. Halterman, p. 37.
9. Donker, p. 25.

Welding Technicians

Job titles and positions typical of this group include the following:

Welder

Specialist Welder

Welding Supervisor

Welding Foreman

Welding Inspector

Welding Analyst

Due to the interest shown in the welding program presently being conducted by the college, the intent was to investigate the possibility of developing technician programs to meet the occupational needs of those interested in a career in this field. Present enrollment in welding courses included 60-70 day students and 120-130 adults in evening classes. Many of these, particularly the adults, had indicated an interest in becoming certified welders. Yuba College wishes to develop a program to meet the needs of such students and to make it possible for them to gain employment in the welding field.

The ultimate aim of the college is to develop a curriculum which will enable students to attain a level of training between the craftsman and the engineer. Persons trained in this manner would be welding technicians. They would have both the competency to perform with the skill of the craftsman and the understanding and knowledge necessary to assist the engineer in planning a job - namely, selecting materials, planning the layout and design, and, ultimately, employing the principles of construction.

PROCEDURES USED

1. Appointing an Advisory Committee

The Advisory Committee members for the study were selected so as to include the following:

a. individuals well acquainted with the problems confronting those desiring to employ technicians in agriculture and welding.

b. persons who were knowledgeable in each special area of the study.

c. persons who understood the broad spectrum of opportunities available and the type of training required.

The following persons meeting the above criteria were named to the committee:

Louis Kurtz, Chairman	State Department of Employment, Marysville, California
Sandy Beck	Director of Vocational Agriculture, Yuba City Union High School, Yuba City, California
Buck Beeler	Owner - Ford Tractor Agency, Marysville, California
Lewis Clift	Victor Welding Equipment, Yuba City, California
Russell Freemyers	Chairman, Subcommittee on Technology Curriculum, Yuba College - Drafting Instructor
Roy Landerman	California Canning Peach Ass'n., Yuba City, California
Abel Leal	Manager, Farm Labor Office, State Department of Employment, Marysville, California
Carroll Moore	Moore's Welding Supply, Chico and Sacramento, California
William Pattison	Owner, Yuba Sutter Landscaping, Yuba City, California
Leland Ruth	Director of Information, Agricultural Council of California, Sacramento, California

Specifically, the main purposes of the Advisory Committee were to give guidance to the staff of the Agriculture Department and to

a. help formulate a plan for this study.

b. provide names and addresses of firms to be contacted.

c. help evaluate data obtained and help plan methods to be used.

d. provide advice in areas of specialization.

e. help prepare the list of recommendations from the study and evaluate the implications of the study.

f. disseminate information to interested persons and organizations interested in the development of technical educational programs in these areas.

2. Assembling Lists of Firms to be Contacted

The first major task of the Advisory Committee was for each member to compile a list of prospective candidates to interview, primarily from his own area of specialization. Agricultural commissioners, farm advisors, and teachers of vocational agriculture in the five-county area were also requested to provide names and addresses of firms.

3. Developing the Survey Forms

The purpose of the first form developed was to attempt to determine the interests of high school sudents in the area of technical educaticn. (See Chapter II.)

A second form, composed of three parts, was developed to obtain information from the firms to be interviewed. (See Chapter III.)

a. Part I of the survey form included questions of a general nature about the firm and its employees. (See Appendix I.)

b. Part II was designed to obtain information on the type of training necessary for each area of specialization. (See Appendix I.)

c. Part III concerned general educational requirements. (See Appendix I.)

4. Selecting an Interviewer

From the beginning, it was felt that the most valid responses would be obtained by using a full-time interviewer rather than mailing questionnaires to the firms. Yuba College was fortunate in being able to hire a former Yuba College student and Fresno State College graduate to conduct the interviews.

5. Conducting a Pilot Study

After developing the survey forms, the interviewer and study supervisor prepared a procedure sheet for conducting the surveys. They then surveyed several firms and reported the results to the Advisory Committee. The forms were further refined, and then again reviewed by the Committee. The Committee determined that the responses received during the pilot study were valid.

6. Conducting the Survey

An advance letter was sent to each firm explaining the purpose of the survey and expressing the desire to interview a representative or representatives of the firm. The letter was followed by a telephone call to establish the time and place of the interview. The results of the interviews were tabulated at the end of each day, whenever possible.

CHAPTER II

RESULTS OF THE HIGH SCHOOL SURVEY

Six hundred seventeen vocational agriculture students from high schools in the primary five-county area were surveyed to determine their opinions and interests concerning occupational and technical education. The survey was administered by the vocational agriculture instructors in these schools.

Before they filled out the survey form, the differences between academic, technical, and occupational types of training were fully explained to the students by the instructor.

Following is a summary of student responses with the results expressed in percentages:

A. WHAT ARE YOUR ULTIMATE EDUCATIONAL PLANS?

Responses	Percent
Quit school at 16	0.6
Finish high school	22.8
Attend junior college	40.4
Attend state college	21.6
Attend University of California	6.8
Join Service or get a job	7.8
	100.0

B. WHAT IS YOUR OPINION OF SCHOOL IN GENERAL?

Responses	Percent
I do not like it	9.5
Not interested in subjects	8.3
Not able to learn what I would like to	11.4
Most subjects are interesting	44.0
I like school	26.8
	100.0

C. WHICH SUBJECTS DO YOU LIKE THE BEST?

(Students were asked to choose 3)

Responses	Percent
English	12.6
Mathematics	14.7
Social Science	10.3
Natural & Physical Sciences	12.1
Industrial Arts	18.8
Languages	0.3
Agriculture	31.2
	100.0

D. WHICH SUBJECTS DO YOU LIKE THE LEAST?

(Students were asked to choose 3)

Responses	Percent
English	21.6
Mathematics	17.3
Social Science	14.4
Natural & Physical Sciences	12.5
Industrial Arts	7.6
Languages	22.2
Agriculture	4.4
	100.0

E. HOW DIFFICULT IS SCHOOL FOR YOU?

Responses	Percent
Very easy	2.5
Fairly easy	25.1
Just average	49.7
Fairly hard	20.5
Very hard	2.2
	100.0

F. WHAT IS YOUR OVER-ALL GRADE POINT AVERAGE?

Responses	Percent
A	1.4
B	26.7
C	60.7
D or less	11.2
	100.0

The students were asked how they rated their ability to solve problems and work with their hands. They were also asked what types of work they wished to do for the rest of their lives.

The following is a summary of their responses:

G. WHAT IS YOUR ABILITY TO WORK WITH YOUR HANDS?

Responses	Percent
Good	50.3
Average	48.2
Poor	1.5
	100.0

H. WHAT IS YOUR ABILITY TO SOLVE PROBLEMS?

Responses	Percent
Good	22.1
Average	68.8
Poor	9.1
	100.0

I. WHAT WOULD YOU LIKE TO DO FOR YOUR LIFE'S WORK?

Responses	Percent
Solve problems	10.4
Work with hands	49.4
Some of both	40.2
	100.0

The next two questions were used to illustrate (1) the student's judgment of his ability to work with abstract ideas or to conceive new methods and (2) his ability to manipulate materials in the actual process of construction.

J. CREATIVE ABILITY?

Responses	Percent
Good	23.6
Average	66.4
Poor	10.0
	100.0

K. MANIPULATIVE ABILITY?

Responses	Percent
Good	35.3
Average	56.5
Poor	8.2
	100.0

The definitions of scientist, engineer, technician and craftsman were carefully explained to the students by the instructor. In addition, they were told the type of training necessary, the length and extent of this training, and the job positions available in each category. They were then asked to make responses to the following questions:

L. WHAT IS YOUR INTEREST IN EACH OF THE FOLLOWING AREAS?

Responses	Percent		
	Scientist or Engineer	Technician	Craftsman
Do not have the ability	22.3	15.4	8.7
Am not interested	33.8	30.9	32.1
Am interested	25.7	27.9	25.6
Do have the ability	18.2	25.8	33.6
	100.0	100.0	100.0

SUMMARY AND CONCLUSION

The survey forms were filled out by the students. Their choices of the responses offered being shown by check (V) marks. A respresentative sampling was taken consisting of freshman through the seniors.

It is recognized that a survey of this type has limitations: the clarity of the questions and lack of understanding on the part of the student must be taken into consideration By and large, however, it is felt that the majority of those responding made an honest effort to select the responses they felt expressed their ideas. The fact that many remarks, although unsolicited, were written in the comments column shows the earnestness of the students to give the proper response.

An analysis of the percentages reveal some interesting points:

1. nearly 70% of the students who were enrolled in courses that once were considered to be vocational in nature, or training for a job, are now planning to go on to college. Forty percent of the total planned to attend a junior college. This quite clearly indicated that those students were concerned about having the proper amount and type of training in order to attain the level of achievement they considered desirable for proper job placement.
2. over 70% indicated that most subjects were interesting and that they liked school.
3. when asked to select three courses they liked best, 31% of the checks were for agriculture. (Note: 31% indicates that 574 of 1,851 checks were for agriculture.)
4. ninety-five percent indicated that schoolwork ranged from fairly easy to fairly hard. Nearly one-half of the total said that schoolwork was just average in difficulty. This correlates with the fact that 61% indicated a grade point average of "C", 28% marked "B" or better, and 11% marked "D" or less.
5. although the students seemed to rate themselves high (91% average or above) in ability to solve problems, only 10% indicated a desire to do this for their life's work.
6. when asked about their creative and manipulative ability, 90% felt they were average or above in those areas. Yet, when asked if they were interested, or if they had the ability to become scientists or engineers, about 45% said yes, whereas in the areas concerning their having the ability or desire to become technicians or craftsmen, 54% (technicians) and 59% (craftsmen) said yes.

The primary purpose of this questionnaire was an attempt to learn what judgments students in vocational high school courses would make concerning their educational aims and preparation for the world of work. Secondarily, it was hoped that the students' exposure to the different ability and achievement levels of vocations included in the questionnaire gave them a better understanding of the opportunities available through higher education.

CHAPTER III

RESULTS OF THE BUSINESS COMMUNITY SURVEY

PART I. THE FIRM AND ITS EMPLOYEES

One hundred thirteen business firms were interviewed. Following is a breakdown of the persons interviewed and the location of the firms.

TABLE I

NUMBER AND TYPES OF FIRMS INTERVIEWED	Ag. Science	Ag. Engineer	Nursery	Welding	Total
Managers Interviewed	42	26	21	19	108
Employees Interviewed	2	2	0	1	5
Total Firms Interviewed	44	28	21	20	113
Primary Area: 1. Butte	5	12	1	8	26
2. Colusa	0	1	1	0	1
3. Glenn	2	0	0	0	2
4. Sutter	15	10	4	5	34
5. Yuba	3	4	5	2	14
Firms in Primary Area	25	27	10	15	77
Firms in Secondary Area*	19	1	11	5	36

*Included Alameda, Contra Costa, Napa, Placer, Sacramento, San Francisco, San Joaquin, Santa Clara, Solano and Yolo Counties

The person interviewed in most cases was the manager or a person in a managerial position. It was felt this level of representative could more readily supply the type of information sought. An attempt was made to interview representatives of the majority of the firms in the primary area, and at the same time, obtain a sampling of similar firms in the secondary area. The purpose was to determine whether or not the needs were similar. (See Table I.)

It was found that the majority of firms included in the study employed fewer than twenty people on a permanent basis. About one third of the agricultural science firms and one fourth of the agricultural engineering, nursery, and welding firms employed more than twenty people permanently. This indicated that most of them were fairly small businesses.

Most of the represented firms employed a relatively small number of seasonal workers, with the exception of the agricultural science firms where about one half employed twenty-one or more people during seasonal peaks of business. Approximately 83% of all firms hired five or less new permanent employees each year. The larger firms employed proportionately more. Nearly 70% employed five or fewer new seasonal employees each year. The exception was those firms, such as canners, which required a larger seasonal work forces. (See Table II.)

TABLE II

EMPLOYEES	Types of Firms: Ag. Science	Ag. Engineer	Nursery	Welding	Total
Permanent Employees					
0-5	7	6	9	7	28
6-10	7	7	4	4	22
11-20	12	9	1	3	25
21 & over	15	6	6	6	33
Seasonal Employees					
0-5	17	22	12	15	66
6-10	1	3	4	2	10
11-20	3	3	1	1	8
21 & over	20	0	3	2	25
New Permanent People Employed Each Year					
0-5	34	26	16	18	94
6-10	3	0	3	0	6
11 & over	3	2	1	2	8
New Seasonal People Employed Each Year					
0-5	22	24	15	16	77
6-10	0	2	3	0	5
11 & over	18	2	2	4	26

Over one half of the firms reported that 26% or more of their permanent employees were technicians while 102 firms said that 10% or less of their seasonal work force was composed of technicians. This indicated technician-type jobs provided more stable employment.

TABLE III

PERCENTAGE OF TECHNICIANS, CRAFTSMEN AND PROFESSIONAL PEOPLE IN WORK FORCE	Types of Firms: Ag. Science	Ag. Engineer	Nursery	Welding	Total
Percent of Technicians in Permanent Work Force					
0-10% of total force	9	4	6	5	24
11-25% of total force	6	8	5	7	26
26% of total force & over	24	16	10	8	58
Percent of Technicians in Seasonal Work force					
0-10% of total force	37	25	18	20	100
11-25% of total force	0	0	0	0	0
26% of total force & over	3	1	5	0	9
Percent of Craftsmen in Permanent Work Force					
0-10% of total force	32	11	14	7	64
11-25% of total force	2	3	4	2	11
26% of total force & over	4	14	1	12	31
Percent of Craftsmen in Seasonal Work Force					
0-10% of total force	36	27	17	11	91
11-25% of total force	0	0	0	3	3
26% of total force & over	2	1	2	7	12
Percent of Professional People in Permanent Work Force					
0-10% of total force	11	2	3	4	20
11-25% of total force	13	14	7	6	40
26% of total force & over	15	12	10	10	47
Percent of Professional People in Seasonal Work Force					
0-10% of total force	37	27	20	19	103
11-25% of total force	0	1	0	0	1
26% of total force & over	0	0	0	0	0

The majority of the agricultural science and nursery firms reported that 10% or less of their employees were craftsmen while more than one half of those interviewed in agricultural engineering and welding indicated 26% or more of their employees were craftsmen.

As a general rule, if the firm was quite large, the percentage of professional people or managerial-type positions was smaller than was the case for firms employing fewer than twenty people. In these smaller firms, on the other hand, 26% or more of the total work force was composed of professional people. (See Table III.)

When asked what the employment prospects for the future were, 60% of the firms felt the prospects were rising. About 33% felt that employment prospects were remaining constant. Only seven of 113 firms felt employment prospects were falling.

A large majority of firms indicated that most of their new employees were persons that came to their business seeking a job on their own. (See Table IV.)

TABLE IV

NEW EMPLOYEES	Types of Firms: Ag. Science	Ag. Engineer	Nursery	Welding	Total
Employment Prospects					
Rising	20	18	16	19	69
Remaining Constant	17	10	5	5	37
Falling	7	0	0	0	7
Methods of Obtaining New Employees (Checked more than one)					
State Employment Service	16	12	10	7	45
Private Agency	4	1	3	1	9
Advertising	10	7	5	6	28
Persons Seeking Jobs on Own	36	26	19	18	99
Other Sources	22	11	12	9	54

Persons directly concerned with the educational development of technicians were asked what amount and type of training was needed by technicians. They were also asked whether they felt training of technicians should be specifically for the job or for a degree. Table V shows the results of the responses to these questions.

Seventy-five percent felt technicians should have some college training. About 45% of those interviewed felt a junior college two-year program would provide the desired type of training. Only four firms felt that emphasis should be placed on obtaining a degree as compared to specific job training. (See Comments- Appendix II.)

TABLE V

AMOUNT AND TYPE OF EDUCATION DESIRED FOR TECHNICIANS	Types of Firms: Ag. Science	Ag. Engineer	Nursery	Welding	Total
Amount of Education Desired for Technicians					
College Graduate	17	0	2	0	19
Junior College Graduate	18	5	13	5	45
Some College	5	8	2	6	21
High School	1	10	5	4	20
No High School	0	0	0	0	0
Other	0	1	0	4	5
Should Emphasis Be Placed On Obtaining a Degree?					
Yes	2	1	0	1	4
No	39	28	20	17	104

The majority of representatives of firms were of the opinion that they presently supply on-the-job training for their new technicians, mainly because there is no other type of training available. The exception was agricultural engineering, where most firms sent their employees to company training schools. Their criticism concerning company training schools was that most employees are able to learn **how** something is done because the emphasis is put on performing a specific skill rather than attempting to give the employee a broader understanding of **why** it is done that way.

A variety of sources of technical information was available to employees, but the majority of the managers seemed to feel the employees gained the most from their immediate boss or their fellow workers. (See Table VI.)

TABLE VI

TYPES OF TECHNICAL TRAINING AND SOURCES OF INFORMATION	Types of Firms: Ag. Science	Ag. Engineer	Nursery	Welding
Kinds of Training Provided by Companies (Check one or more)				
On-the-Job Training	41	29	19	19
Company School	4	23	1	5
None	0	0	0	2
Other	1	0	1	2
Sources of Technical Information (Check one or more)				
Agricultural Colleges	32	8	9	3
Agricultural Agencies	39	8	11	3
Company Publications	16	22	2	7
Trade Publications	34	22	18	15
Night School	8	5	2	9
Immediate Boss	37	26	19	16
Self or Fellow Workers	36	24	16	17
Other Sources	3	9	1	0

The majority of the firms felt there was a definite need for a technician-training program as is indicated in Table VII.

TABLE VII

NEED FOR TECHNICIAN PROGRAMS	Types of Firms: Ag. Science	Ag. Engineer	Nursery	Welding	Total
Is There a Need for a Technician Program?					
Yes	31	24	19	19	93
No	11	4	1	0	16

Nearly all of those interviewed indicated a willingness on the part of the firms they represented to cooperate in a training program by making available their facilities, equipment, and specialists to help the college. (See Table VIII.)

TABLE VIII

WILLINGNESS TO COOPERATE	Types of Firms: Ag. Science	Ag. Engineer	Nursery	Welding	Total
Will your Firm Cooperate in This Program? (Field Trips, Work Experience, Provide Instructional Aids)					
Yes	39	28	20	18	105
No	3	0	0	1	4

PART II. AREAS OF SPECIALIZED TRAINING NECESSARY

Part II of the survey form was designed so that each area of specialization had a separate page. All of the possible types of courses that could be offered, with a brief description of each, were listed on this part of the survey form.

The persons interviewed were to number the five most important courses, 1, 2, 3, 4, 5, in order of importance. The respondents were asked to check (V) any other courses they felt would be valuable. When tabluating the results, a weighted value was given to the numbers, as indicated:

Example:	Numbers Assigned or Check (V)	Weighted Value
	1	6
	2	5
	3	4
	4	3
	5	2
	(V)	1

The courses having the highest weighted numerical value, after tabulating all of the results, would be the course most desirable to include in the curriculum.

Following are lists of those courses, and their weighted numerical values, as selected by the respondents:

AGRICULTURAL SCIENCE

Courses Listed in Order of Importance and Weighted Numerical Value for Each

Course	Score	Course	Score
1. Fertilizers & Sprays	139	8. Livestock Diseases & Parasites	48
2. Plant Diseases & Pests	135	9. Livestock Feeds	38
3. Plant Science	132	10. Livestock Production	30
4. Crop Production	122	11. Dairy Production	25
5. Soil Science	109	12. Poultry Production	25
6. Farm Mechanics	90	13. Animal Science	24
7. Agricultural Projects	72	14. Other	84

AGRICULTURAL ENGINEERING

Course	Score	Course	Score
1. Agricultural Mechanical Skills	114	9. Drafting I	39
2. Agricultural Machinery	95	10. Agricultural Surveying	34
3. Hydraulics	86	11. Agricultural Processing	24
4. Agricultural Tractors	82	12. Agricultural Buildings & Equipment	14
5. Agricultural Welding	62	13. Drafting II	10
6. Agricultural Power	55	14. Other	20
7. Irrigation & Drainage	49		
8. Agricutural Plumbing & Electricity	39		

NURSERY AND LANDSCAPING

Course	Score	Course	Score
1. Plant Science	71	10. Farm Mechancis	21
2. Fertilizers & Sprays	71	11. Agricultural Projects	18
3. Nursery Plant Identification & Uses	68	12. Farm Accounting	16
4. Plant Diseases & Pests	66	13. Drafting	13
5. Landscape Management	42	14. Farm Management	13
6. Landscape Design	41	15. Greenhouse Management	12
7. Soil Science	41	16. Farm Tractors	12
8. Nursery Practices & Management	37	17 Nursery, Plumbing & Electricity	11
9. Landscape Contracting	29	18. Other	19

WELDING

Course	Score	Course	Score
1. Arc Welding II	120	10. Automatic & Semi-Automatic Processes	51
2. Arc Welding I	116	11. Metallurgy & Heat Treating	50
3. Welding Processes	112	12. Drafting I	45
4. Acetylene Welding I	110	13. Drafting II	37
5. Acetylene Welding II	109	14. Destructive & Non-Destructive Testing	31
6. Advanced Arc Welding	94	15. Advanced Acetylene Welding	30
7. Fabrication	75	16. Other	15
8. Practical Experience	71		
9. Properties of Materials	64		

Most respondents also commented relative to the type of training that was needed, and their comments are in Appendix II.

PART III. GENERAL EDUCATION REQUIREMENTS

All firms were asked to make a judgment on what types of courses should be used to further the full educational development of the prospective technician. The same method of numerically weighting their responses as was used in Part II produced the following results:

AGRICULTURAL SCIENCE

MATHEMATICS	Score	SCIENCES	Score
1. Mathematics, general	222	1. Biology	179
2. Elementary Algebra	123	2. Botany	122
3. Plane Geometry	67,	3. Inorganic Chemistry	118
4. Advanced Algebra	35	4. Organic Chemistry	101
5. Analytic Geometry or Calculus	18	5. Physics	72
6. Plane Trigonometry	11	6. Physical Sciences	35
7. Descriptive Geometry	6	7. Zoology	20
8. Other	7	8. Advanced Sciences	11
		9. Other	17

GENERAL	SCORE
1. English & Writing	173
2. Basic Economics	170
3. Speech	129
4. Psychology	78
5. Political Science	49
6. Typing	35
7. Sociology	8
8. Other	58

AGRICULTURAL ENGINEERING

MATHEMATICS	Score	SCIENCES	Score
1. Mathematics, general	168	1. Physics	111
2. Elementary Algebra	85	2. Botany	46
3. Plane Geometry	53	3. Organic Chemistry	37
4. Descriptive Geometry	22	4. Biology	34
5. Advanced Algebra	20	5. Physical Science	30
6. Analytic Geometry or Calculus	10	6. Inorganic Chemistry	28
7. Plane Trigonometry	9	7. Zoology	8
8. Other	10	8. Advanced Sciences	5
		9. Other	0

GENERAL	Sore
1. English & Writing	120
2. Speech	114
3. Basic Economics	112
4. Psychology	39
5. Political Science	21
6. Typing	21
7. Sociology	9
8. Other	11

NURSERY AND LANDSCAPING

MATHEMATICS	Score
1. Mathematics, general	118
2. Plane Geometry	49
3. Elementary Algebra	46
4. Descriptive Geometry	25
5. Advanced Algebra	16
6. Plane Trigonometry	11
7. Analytic Geometry or Calculus	5
8. Other	6

SCIENCES	Score
1. Botany	90
2. Biology	73
3. Inorganic Chemistry	52
4. Organic Chemistry	45
5. Physics	27
6. Physical Science	19
7. Advanced Sciences	8
8. Zoology	0
9. Other	2

GENERAL	Score
1. English & Writing	83
2. Speech	76
3. Basic Economics	73
4. Psychology	42
5. Sociology	26
6. Typing	24
7. Political Science	13
8. Other	6

WELDING

MATHEMATICS	Score
1. Mathematics, general	84
2. Elementary Algebra	40
3. Plane Geometry	38
4. Plane Trigonometry	13
5. Advanced Algebra	13
6. Descriptive Geometry	9
7. Analytic Geometry or Calculus	0
8. Other	1

SCIENCES	Score
1. Physics	48
2. Inorganic Chemistry	29
3. Organic Chemistry	20
4. Physical Science	14
5. Advanced Sciences	6
6. Biology	3
7. Botany	0
8. Zoology	0
9. Other	0

GENERAL	Score
1. English & Writing	62
2. Basic Economics	48
3. Speech	23
4. Psychology	23
5. Typing	14
6. Sociology	9
7. Political Science	2
8. Other	0

point here is that most firms wanted emphasis on job training, yet they would prefer a person with some type of degree.

6. many of those interviewed did not seem to have a clear understanding of what a curriculum is, or the difficulties involved in trying to make a training program satisfy their needs yet fit into the overall college program. They were not as concerned about meeting the state or local college standards as they were about the amount and type of training necessary for their areas of specialization.

SUMMARY AND IMPLICATIONS

Some facts appear quite clearly as a result of this survey.

1. The 113 firms employed 6,845 persons and 969 of these are considered technicians. Those same firms interviewed employed 278 new technicians each year. Smaller firms tend to hire more new people and train them. Larger firms tend to hire these people away from the smaller firms because the large ones are able to offer better positions, more pay, and better opportunity for advancement.
2. Few technical positions are seasonal in nature. Most persons having the training to qualify for a technical position are almost assured of a permanent position.
3. Employment prospects are rising, in most cases with a tendency toward more diversified training needed.
4. Most firms would prefer to hire a person with some college training, with possession of a degree given highest priority.
5. Present types of training given in both company schools or high school are lacking from a practical standpoint, in the opinion of the respondents. Most employers expressed the need for work experience as an integral part of the training.
6. There is a definite need for technician training, with nearly all firms represented in the study expressing a desire to help with that training.

RECOMMENDATIONS

On reviewing the results of the survey, the Agriculture Department, its Advisory Committee, and the Study Consultant make the following recommendations:

I. That technical programs in Agricultural Engineering, Agricultural Science, Nursery and Landscaping, and Welding be established at Yuba College.

It is felt that these programs should be in operation not later than 1970.

II. That the programs be developed in the following order of priority:

A. Nursery and Landscaping Technician

B. Agricultural Engineering Technician and Welding Technician

C. Agricultural Science Technician

Prior to the commencement of this study, members of the applied Arts Division and the ad hoc Joint Committee decided to recommend to the administration the initiation of that program which apparently would meet the greatest need. As that program developed and enrollment assured success, others would be initiated.

In conjunction with work being done by the ad hoc Joint Committee and the Sub-Committee on Technology Curriculum undertaken during the Spring Semester 1965, results of the survey material received at that time indicated that the area showing the most prominent need was that of Nursery and Landscaping Technician. Completion of the survey reinforced the decision to give highest priority to this curriculum, for the following reasons:

1. courses developed for this technician area can be used to round out the present curriculum.
2. with modification present courses will satisfy a portion of the training requirements in this area.
3. use of present facilities and equipment will increase their utilization.
4. there are areas on the new campus which are adaptable to practical landscaping design and management practices from which both the college and the student will benefit from this natural advantage.
5. there are many employment prospects for students in the nursery and landscaping area.
6. the development of the Agricultural Engineering and Welding technician programs depends largely upon more costly facilities and equipment. Multi-use facilities in the proposed Science Technology Center such as a Metallurgy and Heat Treatment Lab, Materials Testing Lab, Hydraulic Lab, and Automatic and Semi-Automatic Welding Machines Lab are necessary for technician training programs in these areas.

7. the technician program in Agricultural Science will be able to utilize part of the facilities and equipment of the Nursery and Landscaping program as it develops. In addition, facilities for work with livestock will be needed to complete the training requirements in this area.

III. That Yuba College adopt the following proposed technician curriculums:

A. Agricultural Technician Curriculum

Option 1 - Nursery and Landscaping
Option 2 - Agricultural Science
Option 3 - Agricultural Engineering

B. Welding Technician Curriculum

(See Appendix III for proposed curriculums)

IV. That adequate classrooms, laboratories, and equipment as listed below be provided for each of the following technician areas:

A. **Nursery and Landscaping Technician**

1. Greenhouse
2. Lath house
3. Student work area
4. Storage facilities
5. Growing areas
6. Tools and equipment to train students adequately as Nursery and Landscaping Technicians

B. **Agricultural Science Technician**

1. Livestock laboratory
2. Crops laboratory
3. Tools and equipment to train students adequately as Agricultural Science Technicians

C. **Agricultural Engineering Technician**

1. Agricultural tractors and machinery laboratory
2. Hydraulics laboratory
3. Tools and equipment to train students adequately as Agricultural Engineering Technicians

D. Welding Technician

1. Arc and acetylene welding laboratory
2. Automatic and semi-automatic welding machines laboratory
*3. Materials testing laboratory
*4 Metallurgy and heat-treating laboratory
5. Tools and equipment to train students adequately as Welding Technicians

Most of the laboratories recommended for the technician programs are multi-use facilities used by other curriculums in the Agriculture and Welding Departments and in combination with other programs within the school.

V. Develop counseling and guidance materials for distribution to high schools to better prepare and select students for these programs.

V. Plan a follow-up program on placement of graduates and their subsequent success.

VII. Institute an evaluation program to make any changes necessary in training as the programs proceed.

VIII. Maintain a permanent advisory committee with members rotated to represent all segments of agriculture.

***Laboratories that are proposed by other departments within the school and which will be used cooperatively.**

NOTES and COMMENTS

APPENDIX I

YUBA COLLEGE SURVEY FORM

Agriculture and Welding Departments

PART I

Type of Business Firm:
- Ag. Science
- Ag. Engineering
- Nursery
- Welding

Respondent (name) Title
- Managerial Staff
- Employee

City in which business is located County

Number of employees: (approximate)
- Permanent
- Seasonal (in addition to permanent)

Employment prospects in future:
- Rising Attributed to what?
- Remaining Constant
- Falling

How many new people do you employ, each year? (approximate)
- Permanent Comment:
- Seasonal (additional to permanent)

Where do you find new employees?
- State Employment Service
- Private Agency
- Advertisement
- Persons Seeking Jobs on Their Own
- Other

How many of your employees would fall into the category of technician?
- Permanent (approximate)
- Seasonal

How many of your employees would fall into the category of craftsmen?
- Permanent
- Seasonal

How many of your employees would you consider being professional?
(e.g., managers, clerical, engineers, scientists, etc.)
Permanent
Seascnal

Can we return for more information?

What do you need specifically?

What are your main employee problems?

Does your company provide any kind of training for employees?

On-the-job training
Company School
None
Other

Ccmment:

What do you consider the educational background of your technicians should be:

College Graduate
Jr. College Graduate
Some College
High School
Other

Why?

Do you feel some of your technicians have more formal schooling than is justified for their work?

Yes

No

Why?

Where do your technicians obtain technical information relating to their field?

Agriculture Colleges
Agriculture Agencies
e.g. (Extension, Ag. Commissioner, etc.)
Company Publications
Trade Publications
Night School Classes
Immediate Boss
Self or Fellow Workers
Other

Do you feel there is a need for technician training programs where the emphasis is put on training for the job rather than schooling for the sake of a degree only?

Yes
No

Why?

If Yuba College initiates a program to train technicians in your field would you cooperate in this program?

Yes

No

How?

Provide Facilities for Training
Field Trips

Use of Company Resources

Personnel

Possible Positions for Graduates

Other

Are there any comments you wish to make concerning areas of instruction or types of training that are needed in this field?

PART II

AGRICULTURAL ENGINEERING TECHNICIAN

(Courses that could be included in this curriculum)

DIRECTIONS: Indicate in order of preference five (5) courses you think should be offered. Number the most important courses (in your opinion) No. 1, 2, 3, 4, 5. **Number only 5.** Check (V) any others you think may be beneficial.

Agricultural Mechnical Skills-
Using tools and equipment

Agricultural Machinery -
Operation, maintenance, repair

Agricultural Tractors -
Operation, maintenance, repair

Agricultural Power -
Principles of applying power to machines

Agricultural Building and Equipment -
Planning, selection, principles of construction

Agricultural Processing Equipment -
Operation, maintenance, development and design

Agricultural Surveying -
Land measurement, leveling

Irrigation and Drainage -
Methods of applying and measuring water

Agricultural Plumbing and Electrification -
With emphasis on planning and installing simplified systems

Agricultural Welding -
Arc and acetylene processes necessary for construction and repair of equipment

Hydraulics -
Application of the uses of fluids, cylinders, and pumps as a motive force

Drafting I -
Fundamentals of mechanical drawing

Drafting II
Detail drawings and assembly drawings

Agricultural Projects -
Supervised planning, design, and construction of projects

Work Experience -
On-the-job training

Other

PART II

AGRICULTURAL SCIENCE TECHNICIAN

(Courses that could be included in this curriculum)

DIRECTIONS: Indicate in order of preference five (5) courses you think should be offered. Number the most important courses (in your opinion) No. 1, 2, 3, 4, 5. **Number only 5.** Check (V) any others you think may be beneficial.

Plant Science -

Basic course in plant structure and growth, plant physiology, plant nutrition, and plant breeding

Animal Science -

Basic course in animal physiology, animal nutrition, and animal breeding

Livestock Production -

Basic course in the principles and practices of livestock production (beef, sheep, swine, and dairy)

Crop Production -

Basic course in the principles and practices of crop production, field crops, forage crops

Fertilizers and Sprays -

A basic course in types and composition of fertilizers and chemical spray materials and their uses

Livestock Diseases and Parasites -

A basic course in the common livestock diseases and parasites and their controls

Plant Diseases and Pests -

A basic course in plant diseases and pests and their controls

Agricultural Mechanical Skills -

Using tools and equipment

Soil Science -

Origin and chemical properties of soils, soil classification management, and soil conservation

Agricultural Projects -

Supervised field laboratory designed to give the student practical experience in his major field

Dairy Production -

Basic principles of milk production and dairy cattle management

Poultry Production -

Basic principles and practices of egg-fryer and turkey production

Livestock Feeds -

Livestock feeds, their analysis and uses, computation of rations for various classes of livestock

PART II

NURSERY AND LANDSCAPE TECHNICIAN

(Courses that could be included in this curriculum)

DIRECTIONS: Indicate in order of preference five (5) courses you think should be offered. Number the most important courses (in your opinion) No. 1, 2, 3, 4, 5. **Number only 5.** Check (V) any others you think may be beneficial.

Plant Science -

Basic course in plant structure and growth, plant physiology, plant nutrition and plant breeding

Fertilizers and Sprays -

A basic course in types and composition of fertilizers and chemical spray materials and their uses

Agricultural Mechanical Skills -

Using tools and equipment

Plant Diseases and Pests -

A basic course in plant diseases and pests and their controls

Soil Science -

Origin and chemical properties of soils, soil classification, management, and soil conservation

Agricultural Projects -

Supervised field laboratory designed to give the student practical experience in his major field

Agricultural Plumbing and Electrification -

For nursery layout and sprinkler irrigation system

Drafting -

Freehand lettering, sketching, and geometric construction

Nursery Practices and Management -

Commercial nursery operation, propagation, transplanting, potting, fertilizing, and pest control

Landscape Design -

Basic principles of landscape design theory, layouts, space, color, and materials, and their relationship

Nursery Plant Identification and Their Uses -

Identification of California nursery and landscaping shrubs, trees, plants, vines, and their uses

Greenhouse Management -

Production of major commercial potted plants under glass and lath

Landscape Contracting -

Practices in supervising men and applying approved techniques in landscape construction, estimating cost, and contract writing

Landscape Management -

Planting, care and maintenance of lawns, flower beds, and shrubs

Agricultural Tractors -

Operation, maintenance, and repair

Farm Management -

Agricultural marketing, credit, financing, and the use of resources

Farm Accounting -

A basic course in production, inventory, depreciation, single entry financial records, and income tax records

Other

PART II

WELDING TECHNICIAN

(Courses that could be included in this curriculum)

DIRECTIONS: Indicate in order of preference five (5) courses you think should be offered. Number the most important courses (in your opinion) No. 1, 2, 3, 4, 5. **Number only 5.** Check (V) any others you think may be beneficial.

Welding Processes -

Introduction to welding - fundamentals of machines and equipment - elementary techniques of arc and acetylene

Arc Welding I -

Development of techniques and procedures in flat position

Arc Welding II -

Development of techniques and procedures in horizontal, vertical, and overhead position

Acetylene Welding I -

Development of techniques and procedures in flat position

Acetylene Welding II -

Development of techniques and procedures in horizontal, vertical, and overhead positions

Advanced Arc Welding -

Layout of materials, design of joints, and fabrication of metals - use of specialized welding materials and techinques

Advanced Acetylene Welding -

Layout of materials, design of joints, and fabrication of metals - use of specialized welding materials and techniques - especially pipe

Drafting I -
Fundamentals of mechanical drawing

Drafting II -
Detail drawings and assembly drawings

Properties of Materials -
Weldability of metals - mechanical properties

Fabrication Methods and Design -
Blueprint reading, methods of layout, joint design, techniques, procedures of machinery design

Metallurgy and Heat Treatment -
Composition, structures, properties of metals - physical effects of shaping and heat-treating before, during, and after welding

Automatic and Semi-Automatic Processes -
Techniques and procedures, joint fabrication, use of specialized materials, new methods, and machines

Destructive and Non-Destructive Testing -
Analysis of the strengths and weaknesses of welds, why they fail

Practical Experience -
Project construction and/or on-the-job training

Other

PART III

GENERAL EDUCATION COURSES

(Courses That Could Be Included In The Technician Curriculum)

DIRECTIONS: Under each category below indicate in order of preference five (5) courses you think should be offered. Number the most important courses (in your opinion) No. 1, 2, 3, 4, 5. **Number no more than 5 in each category.** Check (V) others you feel may be beneficial.

Mathematics

Mathematics - general
Algebra - elementary
Algebra - advanced
Geometry - plane
Geometry - descriptive
Trigonometry - plane
Analytic Geometry or Calculus
Other

Natural and Physical Sciences (Basic Science)

Biology - general understanding of plants and animals
Botany - basic scientific principles relating to plants
Zoology - basic scientific principles relating to animals
Physical Science - geology, mineralogy, meteorology, hydrology
Physics - physical principles relating to structural materials, thermodynamics, hydraulics, electricity
Chemistry - basic inorganic
Chemistry - organic
Advanced Sciences
Other

General

Basic Economics
Psychology - general
Political Science - government agencies, procedures
English and Writing - reports, letters, studies
Speech - public speaking, leading discussion
Sociology - general
Typing
Other

APPENDIX II

COMMENTS

QUESTION: **What are the Employment Prospects in the Future?**

RISING

"Expansion of size of farm and diversity of operation will increase employment." — large ranch operation

"Additional services to farmers, as well as new markets will insure expansion in the future." — crop duster

"Increased markets, such as sprinkler irrigation, will increase size of company." — pump shop

"Service is becoming more and more important. Farmers are less able to work on their own equipment as time goes on. This along with increased sales will improve our position considerably." — implement dealer

"We turn out specialized farm equipment. Increased farm mechanization will increase the size of our business." — small engineering firm

"This is a growth area. More new homes are being built and increased population points to expansion of our business. Also, there are fields of nursery and landscaping which haven't even been touched yet." — retail nursery

"Would hire a good landscape man today if I could find him. This business could be twice as big if we had more qualified help. Programs like yours should insure that help coming in the future." — retail landscape nursery

"Increased uses of welding will expand the market and thus increase employment." — welding engineer

"Increased industrial activity in this area along with more building, both government and private, will increase the need for good men in the field of welding." — steel products manufacturer

QUESTION: **What are the Employment Prospects in the Future?**

REMAINING CONSTANT

"More orchards are coming into production, but more mechanization will offset this in the way of employment." — farmer

"Size of firm will stay about the same unless business picks up. Only so many farmers buy equipment in any given year." — implement dealer

"Increased efficiency will keep personnel numbers down in the face of expanded business." — implement dealer

"We are in a location where the land is very high priced. We have a limited space in which to operate. We will have to move farther out before we can expand." — retail nursery

"We have reached the plateau in our business at which you don't make any more money by expanding further unless you really go all out. We plan on staying where we are for at least two or three years." — grower, wholesaler

"We have stayed approximately the same size for the last twenty-eight years. More business, no more automation." — welding shop

QUESTION: **What are the Employment Prospects in the Future?**

FALLING

"There will be few and larger growers in the future; also dealing with associations of growers requires fewer men in the field." — canner

"Increased mechanization of harvesting processes will reduce the need for manpower." — farmer

QUESTION: **What do You Consider the Educational Background of Your Technicians Should Be?**

"In order to get one of the top jobs on our ranch, a man should have some training in college. A two-year junior college course would do nicely." — farmer

"We like a man with some college training in agriculture. We don't care about a degree, however, if the man fits into our program." — farmer

"People with some college training have an easier time expressing themselves. They can command more respect because they have a better understanding of problems and solutions." — cooperative

"The person should have enough schooling to be able to understand technical information. Sales people should definitely have some college training, as well as the mechanics." — implement dealer

"A college trained person is more desirable because he knows why he is doing something as well as how to do it." — implement dealer

"We would like someone with college training and the ability to use the knowledge he has obtained. He should know something about electricity. He should be willing to learn and study." — pump shop

"Junior college would be sufficient in most cases in this field. If you go much beyond that the wage scale in the nursery business will not attract good men." — nursery

"We like college trained men because it is possible to get a better grade of person whether he uses all his knowledge or not. Also, we would like to see some more practical training in college." — retail nursery

"Some college is helpful because the people get some of the basic things they need to know, as well as a more rounded personality. Trade schools or similar training in college is a must." — machine shop

"Should be at least a junior college graduate. The more education a man has, the better suited he will be to progress in any business." — steel products company

QUESTION: **Do You Feel There is a Need for Technician Training Programs Where the Emphasis is Put on Training for the Job Rather Than Schooling for the Sake of a Degree Only? Why?**

"Training for the job is more useful in this field than training for a degree. When a person gets a degree, he usually must be partially re-trained by the company before he is of much use to us." — feed mill

"What a person knows is more important than what degree he has. Therefore, we would consider two-year men for employment in our organization." — canner

"A person should learn the general things and theories in college. When he comes to work for us, we will teach him the specific points of our business." — tractor dealer

"Practical knowledge is the most important thing in this business. College men don't usually stay too long. Job training is more important in our opinion." — implement dealer

"Specific knowledge is more important than general knowledge. A person should be able to absorb and understand technical information. Salesmen should have some college." — implement dealer

"Good trained people are scarce in this business. A two-year course for technicians would be a wise idea." —implement dealer.

"A job-trained man is fitted for the job whereas a man trained in generalities is still wondering what he is fitted for." — implement dealer

"If a person is well versed in the field and has accumulated specific knowledge, he does not need a degree for this work." — nursery

"Specific knowledge is much more important than a degree in this business. If a man can do the work, he will be hired whether he has a degree or not." — service nursery

"We can't afford to pay a degree man what he expects to make as a starting salary." — nursery

"Specific knowledge and skills are what count in this business." — engineer

"The person should have some training in the humanities, in addition to his technical training, but the specific training should be foremost." — engineering manager, welding equipment manufacturer

"In a technician training program you should learn some practical things as well as from out of a book. Some time spent in shops would be very helpful in this respect." — machine shop

"A degree means very little in this field; either you can do the job or you cannot. Either you know or you don't know. That is what is important." — welding supplier

"We want specialized training, not general training." — steel products company.

QUESTION: **Does Your Company Provide any Kind of Training for Employees?**

"Our employees learn on the job with some supervision from superiors until they catch on." — cooperative

"Our employees learn by doing on the job. They have a six-month probationary period." — growers' association

"All our training is on the job." — farmer
"We have weekly meetings for key employees in addition to on-the-job training programs." — canner

"We send our key employees to schools put on by the equipment manufacturers. We pay them a full salary plus subsistence while they attend these schools. We also provide on-the-job training." — all implement dealers interviewed

"We try to hire experienced men; we can't afford to send anyone to school. We can't spend too much time training our employees ourselves as this is a small organization." — local engineering firm

"Our company has monthly sales meetings in addition to on-the-job training." — nursery

"All the learning and training is done on the job at the present time." — nursery

"Our people are trained on the job, but there is a need for specialized college training along practical lines." — landscaper

"Our men are trained on the job but some of them take extension courses on their own. " — City Park Department

"Learning on the job, by doing, is the best way to train new employees." — most companies made this remark

"We try to hire experienced help though we will try to train helpers." — machine shop

"Our company pays the tuition and other costs for evening college and special industrial courses." — welding company

"In a small shop like this one we can't afford to carry more than one apprentice." — welding shop

QUESTION: **Are There any Comments You Wish to Make Concerning Areas of Instruction or Types of Training that are Needed in This Field?**

"Put together a course that covers agricultural chemistry and physics hitting the basics of each. Do the same with biology and botany as they apply to agriculture." — canner and grower

"What we really need is a program combining actual work experience with classroom experience. The practical side should be stressed." — seed company

"A course in farm machinery retailing would be desirable." — implement dealer

"Let's teach the students how things are done in this area and forget about the mid-west." — implement dealer

"A greater knowledge of sprinkler irrigation will be needed in the future." — pump dealer

"Colleges should teach a more wholesome attitude to students about goals, etc." — irrigation company

"Sales people are always in demand. They should be versed in biology, botany, and business." — nursery

"The retail field is the big thing in the nursery business. A small retail nursery can buy stock cheaper than it can be grown. Technicians are really needed in the retail end." — nursery

"Don't try to make a journeyman welder out of the person. Teach him things that he can't learn outside of the classroom." — welding equipment manufacturer

"A person should learn more than just welding in school. There should be emphasis on speed and production as well as actual techniques in the various practical courses." — welding shop

QUESTION: **What do You Need Specifically?**

"We need a fully qualified technologist who is willing to work." — canner

"We need people who like what they are doing. People who work for us should be able to make their own jobs. They should be creative." — farm supply

"We need someone with a basic knowledge of chemistry, entomology, and pathology. Also, he should have ability to meet growers and pass along the information necessary to carry out a successful spray and fertilizer program." — chemical company

"Our organization needs men with an ability and willingness to learn, ambition, agricultural background, and, preferably, a degree. This person should be able to get along with other people. Mechanical knowledge is also helpful in our field due to necessary mechanization of agriculture." — cooperative

"We need someone who can learn fast, is willing to learn, knows mathematics, and some electricity. He needs an agricultural background so that he can deal with and meet people." — cooperative

"Men are needed who are mechanically inclined, can drive a tractor, know pruning, are able to think for themselves. Should have a handyman's knowledge and some welding." — farmer

"We need someone who is interested in his work, who is able to apply the knowledge he obtains in school. Someone who can understand technical information." — irrigation company

"We need someone who knows electricity in relation to pumps and motors, understands the operation of pumps and motors, shop knowledge. Also, this man should be able to trouble-shoot and meet people." — pump shop

"We need someone who is resourceful and knows why he is doing something. Sales ability is needed most in this business. The person must be sincere. Knowledge of hydraulics and electricity is also helpful." — equipment dealer

"We want a person with an agricultural background, young, physically fit, steady, with specialized training, if possible." — golf course

"We need someone with sufficient knowledge to supervise workers, with a knowledge of fertilizers, sprays, grasses, trees, etc. This might be from a junior college." — City Park Department

"We need someone who has a good personality, can meet people, with a basic background in nursery fields." — nursery

"Sales people who can identify plants, should be of managerial caliber, good landscape designer. Person should be teachable and willing to learn and train himself." — nursery

"We need a person who can weld, understand layout work and fabrication, and is willing to work hard and learn. This person should have some practical experience in these things." — welding shop

"We need a person who in addition to welding can read blueprints and drawings, and is familiar with the machines in a machine shop." — welding shop

"At the present time, our biggest need is a man who can heliarc in addition to other welding skills." — machine shop

"We need a man with a background in welding, electricity, a reasonable command of the English language, and at least high school physics." — welding equipment manufacturer

APPENDIX III

PROPOSED CURRICULUMS

Recommended General Education Requirements

for

Agricultural and Welding Technicians Curriculums

Associate in Arts Degree

General Education Requirements	Units
Requirement 2 (All students must complete these courses)	
*English, Technical	6
Hygiene I	2
Psychology 50	⅓
Physical Education	2
Political Science I	3
Group A Requirement (Fine Arts or Humanities, 5 to 6 units)	
Speech 45	3
Elective	3
Group B Requirement (Social Science, 5 to 6 units)	
Business 50	3
Sociology 10	3
Group C Requirement (Natural Science, 6 to 10 units)	
*Mathematics, Technical	3
Chemistry 2	5
Sub-Total	33⅓

*New courses to be developed

AGRICULTURAL TECHNICIAN CURRICULUM

Associate in Arts Degree

	OPTION I	Units
General Education Requirements		33⅓
Nursery and Landscaping Requirement		
Revised †Ag. 71	Introduction to Horticulture	3
Courses Ag. 73	Plant Propagation	3
Ag. 74	Introduction to Soils	3
*Ag. 75	Landscape Plant Identification	3
*Ag. 76	Nursery Practices	3
*Ag. 77	Nursery Management	3
*Ag. 78	Landscape Planning and Design	3
Revised †Ag. 81	Agricultural Mechanics (Electricity, Plumbing, Construction)	3
Courses Ag. 90	Agricultural Projects	4
*Ag. 95	Work Experience (2nd year students only)	2
	Sub-Total	30

Recommended Elective

Business 51A -	Elementary Typing	2
Ag. 83	Agricultural Tractors	3
Art 4A	Art Structures	2
	Sub-Total	7

Total Units — 70½

	OPTION II	Units
General Education Requirements		33⅓
Agricultural Science Requirements		
Revised †Ag. 50	Agricultural Economics	3
Courses Ag. 60	Introduction to Animal Husbandry	3

	Ag. 61	Livestock Feeds and Feeding	3
	Ag. 70	Introduction to Agronomy	3
Revised †	Ag. 71	Introduction to Horticulture	3
Courses	Ag. 72	Fruit Production	3
	Ag. 74	Introduction to Soils	3
Revised †	Ag. 80	Agricultural Mechanics (Shop Skills)	4
Courses	Ag. 90	Agricultural Projects	2
	*Ag. 95	Work Experience	
		Sub-Total	30

Recommend Elective

Business 51A - Elementary Typing		2
Ag. 83	Agricultural Tractors	3
	Total Units — 68⅓	
	Sub-Total	5

OPTION III		Units
General Education Requirements		33⅓
Agricultural Engineering Requirement		
Revised † Ag. 80	Agricultural Mechanics (Shop Skills)	3
Courses " † Ag. 81	Agriculture Mechanics (Electricity, Plumbing, Construction)	3
Ag. 83	Agricultural Tractors	3
Ag. 84	Agricultural Machinery	3
*Ag. 85	Agricultural Power	3
*Ag. 82	Agricultural Surveying and Irrigation	3
†Weld. 81	Introduction to Welding Processes	2
†Weld. 81A	Arc Welding Lab. I	1
†Weld. 81B	Acetylene Welding Lab. I	1
†Weld. 82	Properties of Welding Materials	2

†Weld. 82A	Arc Welding II	1
Ag. 90	Agricultural Projects	4
*Ag. 95	Work Experience	2
	Sub-Total	31

Recommended Electives

Drafting 51	3
Mach. Shop 60 Basic Machine Tools	3
Sub-Total	6

Total Units — 70½

WELDING TECHNICIAN CURRICULUM

Associate in Arts Degree

		Units
General Education Requirements		33½
Welding Requirement		
Draft. 51	Mechanical Drawing	3
†Weld. 81	Introduction to Welding Processes	2
†Weld. 81A	Arc Welding Lab. I	1
†Weld. 81B	Acetylene Welding Lab. I	1
†Weld. 82	Properties of Welding Materials	2
†Weld. 82A	Arc Welding Lab. II	1
†Weld. 82B	Acetylene Welding Lab. II	1
*Weld. 83	Destructive & Non-Destructive Testing (Lec.-Lab.)	2
*Weld. 84	Automatic & Semi-Automatic Processes (Lec.-Lab.)	2
†Weld. 85	Fabrication Methods and Design	2
†Weld. 85A	Advanced Welding Lab.	1

*Mach.		Metallurgy & Heat Treatment	
*Weld.	95	Work Experience (Second year students only)	2
Weld.	90	Welding Projects	4
		Sub-Total	27

Recommended Electives

†Ag.	80	Agricultural Mechanics (Shop Skills)	3
†Ag.	81	Agricultural Mechanics (Electricity, Plumbing, Construction)	3
Mach.	61	General Machine Shop	3
		Sub-Total	9

Total Units — 69½

†Present courses to be revised

*New courses to be developed